

Appl. No.: 010/087,485
Amdt. Dated: February 17, 2004
Reply to Office Action of: November 17, 2003

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 - 14. Cancelled

15. (currently Amended) A ≥ 4 kHz repetition rate fluoride excimer laser system for producing an UV output of wavelength $\lambda < 200\text{nm}$ output, said laser system comprising:

an excimer laser chamber for producing an UV wavelength $\lambda < 200\text{nm}$ discharge at a pulse repetition rate ≥ 4 kHz, and said chamber having at least one window made from a magnesium fluoride single crystal,

wherein said excimer laser chamber includes at least one magnesium fluoride crystal optic window for outputting said $\lambda < 200\text{nm}$ discharge as a ≥ 4 kHz repetition rate excimer laser $\lambda < 200\text{nm}$ output;

wherein said magnesium fluoride crystal optic window, having a 255nm induced absorption less than 0.08 Abs/42mm when exposed to 5 million pulses of 193nm light at a fluence ≥ 40 mJ/cm²/pulse, has an induced absorption of less than 0.08 Abs per 42mm path length when measured at 255 nm, a 42mm crystal 120nm transmission of at least 30% through said 42mm path length, and a 200 to 210 nm range absorption coefficient < 0.0017 cm⁻¹.

16 – 17 Cancelled

18. (Currently Amended) The A laser system as claimed in claim 15, wherein said 42mm crystal has a 120nm transmission is at least 40% through said 42mm path length.

19. (Currently amended) The A laser system as claimed in claim 15, wherein said magnesium fluoride crystal optic window and/or prism has, by weight, an Fe contamination level less than 0.15ppm, a Cr contamination level less than 0.08 ppm, a Cu contamination level less than 0.04 ppm, a Co contamination level less than 0.04ppm, , an A; contamination level less than 0.9 ppm, a Ni contamination level less than 0.4 ppm, a V contamination level less than 0.04 ppm, and a Pb contamination level less than 0.04 ppm.

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20 – 26 cancelled

27. (Currently Amended) ~~The A~~ laser system as claimed in claim 15, wherein said laser system further comprises:

a magnesium fluoride crystal optic prism, said magnesium fluoride crystal optic prism being external from said excimer laser chamber to transmit and control light outputted from said chamber for transmission and control,

wherein said ≥ 4 kHz repetition rate, excimer laser $\lambda < 200$ nm output from said chamber is transmitted through said magnesium fluoride prism and, when exposed to 5 million pulses of 193nm light at a fluence of $> 40 \text{ mJ/cm}^2/\text{pulse}$, said magnesium fluoride crystal optic prism has an 255nm induced absorption less than 0.08 Abs per 42 mm path when measured at 255nm Abs/42mm when exposed to 5 million pulses of 193nm light at a fluence $\geq 40 \text{ mJ/cm}^2/\text{pulse}$, and a 120nm transmission of at least 30% through a 42mm path.

28. cancelled

29. (Currently Amended) The ~~A~~ laser system as claimed in claim 27, wherein said magnesium fluoride crystal optic prism has an 200 to 210 nm range absorption coefficient $< 0.0017 \text{ cm}^{-1}$

30. (Currently Amended) An ≥ 4 kHz repetition rate fluoride excimer laser crystal optic for transmitting a ≥ 4 kHz repetition rate fluoride excimer UV wavelength $\lambda < 200$ nm output, said laser crystal optic comprising:

a magnesium fluoride crystal optic which, when exposed to 5 million pulses of 193nm light at a fluence $> 40 \text{ mJ/cm}^2/\text{pulse}$, has an induced absorption of less than 0.08 Abs per 42mm path, a 120nm transmission of at least 30% and a 200 to 210 nm range absorption coefficient of $< 0.0017 \text{ cm}^{-1}$ with a 255nm induced absorption of less than 0.08 Abs/42mm when exposed to 5 million pulses of 193nm light at a fluence $\geq 40 \text{ mJ/cm}^2/\text{pulse}$ and a 42mm crystal 120nm transmission of at least 30%.

31. (Currently Amended) ~~The A~~ ≥ 4 kHz repetition rate fluoride excimer laser crystal optic as claimed in 30, wherein λ is centered about 193nm.

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32. cancelled

33. (Currently Amended) ~~The A~~ ≥ 4 kHz repetition rate fluoride excimer laser crystal optic as claimed in 30 wherein said magnesium fluoride crystal has, by weight, an a Fe contamination level less than .15 ppm, a Cr contamination level less than 0.06 ppm, a Cu contamination level less than 0.02 ppm, a Co contamination level less than 0.02 ppm, , an Al contamination level less than 0.7 ppm, a Ni contamination level less than 0.2 ppm, a V contamination level less than 0.02 ppm, and a Pb contamination level less than 0.02 ppm.

34 – 40 cancelled

41. (Currently Amended) ~~The A~~ ≥ 4 kHz repetition rate fluoride excimer laser crystal optic as claimed in 30, wherein said magnesium fluoride crystal optic has a flat planar face oriented normal to a ~~e-axis c-axis~~ of said magnesium fluoride crystal.

42. (Currently Amended) ~~The A~~ ≥ 4 kHz repetition rate fluoride excimer laser crystal optic as claimed in 30, wherein said magnesium fluoride crystal optic has a flat planar face oriented non-normal to a ~~e-axis c-axis~~ of said magnesium fluoride crystal.

43. (Currently Amended) ~~The A~~ ≥ 4 kHz repetition rate fluoride excimer laser crystal optic as claimed in 30, wherein said magnesium fluoride crystal has a ~~e-axis c-axis~~ grown magnesium fluoride crystallographic orientation.

44 -50 cancelled

51. (previously presented) The laser system according to claim 15, wherein said laser system is an argon fluoride laser system.

52. (previously presented) The excimer laser optic as claimed in claim 30, wherein said optic is in the form of a laser window or prism.